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THE UNIVERSITY OF ALBERTA

COMPETITIVE ANXIETY AMONG MALE AND FEMALE SWIMMERS AT DIFFERENT AGES AND AT DIFFERENT LEVELS OF COMPETITION.

by

JOHN M. HOGG.

©

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

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FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "Competitive Anxiety among male and female swimmers at different ages and at different levels of Competition," submitted by John Mervyn Hogg in partial fulfilment of the requirements for the degree of Master of Arts.

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Date: October 19, 1978

ABSTRACT

This study used the Sport Competition Anxiety Test (Martens, 1977) to measure the trait competitive anxiety of 275 male and female competitive swimmers registered with the Canadian Amateur Swimming Association (Alberta Section). For a smaller sample of male and female swimmers from one club, in addition to the A-trait data gathered, state anxiety was measured using the State-Trait Anxiety Inventory (Spielberger et al, 1970) in three different levels of competitive situations.

The A-trait data indicated that there is a statistical difference in competitive trait anxiety between male and female swimmers and across all age groups. No significant difference between the A-trait scores of male swimmers and the norms provided by Martens was evident, and the same was found to be true for the females with the exception of the 7th-9th grade swimmers who were found to be statistically higher in A-trait when compared to the corresponding norm.

For the smaller sample of 69 club swimmers whose A-state was measured at three levels of competition there was no difference in A-state increases between male and female swimmers but significant differences were detected as a consequence of age. Those swimmers high in A-trait tended to respond with higher A-states in increasingly threatening competitive situations and similarly those low in A-trait

responded with low A-states. However, this relationship was only apparent for the 15 years and over swimmers but not for the 14 years and under.

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"Out of the strain of doing and
into the peace of the done."

Julia Woodruff

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CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

Competitive anxiety is a popular area of study for sports psychologists today. This interest is reflected in the fact that recently athletes have been subjected to limited forms of scientific investigation and observation leading up to a major competition. Coaches have always attached great importance to the final psychological phases of race preparation. They recognize that it is either excessive or insufficient states of anxiety that can ultimately destroy race performance. The main concern of the coach must be to ascertain the precise anxiety requirements for each athlete in a particular competitive situation, and to understand how these can affect performance. Most coaches too will admit their inability to judge optimal levels of competitive anxiety states that should be present in each athlete just prior to the competition, though intuitively they may be conscious of the extremes. How to maintain optimum levels of competitive anxiety is very much a 'hit and miss' process.

Though research into anxiety states exists there has been very little systematic exploration or applied work carried out directly with the athlete in the sports context. Cattell (1960) suggested that in extremely stressful and competitive sports

situations there may well be athletes of high physical potential who could probably surpass existing records but for the fact of their neurotic personalities. Many important practical questions exist which are of immediate concern to the coach. For instance, what causes the athlete to 'choke' in the stressful competitive situation? Why is it that some athletes rise to the occasion and perform beyond themselves whereas others flounder and fail? How is it that immediately before a race an athlete, to all intents and purposes, appears both physically and psychologically ready to perform well and yet moments later appears totally out of control of the situation and headed for a disastrous performance? Can the coach teach the athlete to consciously control anxiety states to the point where his or her performance potential is fully realized? On the other hand, what can the coach do to alleviate hyper-anxious states in order to avoid psychological burnouts or staleness? Probably the most intriguing question is, given certain information about an athlete's competitive anxiety trait and his or her state responses in varying competitive situations, can the coach now accurately predict performance in a major competition? If he should predict failure then maybe the coach can adopt a preventative course of action that would positively offset any anticipated failure in performance.

There are many sources of anxiety and psychological stresses in the competitive situation which may influence the quality of the athlete's performance. All athletes are very conscious of the

evaluative process freely entered into in the competitive situation. Will they be a success or a failure? Will they match up to their personal expectations or equal those of the coach, their family and friends, or if they are in the public eye, can they suffer the scrutiny of the media without collapsing into mediocrity? In recognizing the ability of the opposition are they psychologically capable of facing up to the demands of the actual race situation? There will be other specific pressures surrounding the athlete too, such things as educational pressures, social or economic stresses, and the pressures that are peculiar to the competitive environment along with excessive concerns about their state of readiness or the lack of it! All these pressures can cause anxiety which generally finds expression in mild or severe forms of physical and mental tension.

It is the job of the coach to be aware of individual anxiety levels and to be sensitive to whether the athlete is over or under-reacting in the face of competition. Maybe the coach should structure anxiety reducing or evoking situations prior to competition to ensure optimum states of alertness. At the same time the coach should be aware of his or her own anxiety patterns in order to avoid communicating these to the athlete. Over-anxiety strangles the total mind-body organism. It cannot be readily dismissed. It is not simply a question of the coach barking at the athlete, "Get a grip

of yourself!" Johnson (1951) suggests that it is the coaches' responsibility to see that the athlete is emotionally tuned for the competition and that the main task in the final phases of race preparation is to minimize all psychological hazards. This means that the coach should possess an intimate knowledge of each athlete and be capable of anticipating or detecting individual crises that might cause great emotional strain or drain the athlete of all physical and psychological reserves.

The coach needs the help of the sports psychologist in order to deal with extremes of competitive anxiety. But if it is the hope of the sports psychologist to assist the coach in understanding individual differences in response to the pressures of the competitive situation, then this will depend very much on his ability to produce a reliable and valid measuring instrument that can be administered quickly and as close to the race situation as possible thus affording the coach immediate and accurate information that may allow him to deal more effectively with some of the emotions that are known to adversely affect the performance of the athlete. Consequently, it is important for the coach to have some feel for important psychological constructs like competitive anxiety, arousal, stress, etc., in so far as they can influence expected performance.

Some important definitions.

Anxiety is a very confusing term with unavoidably negative implications related to either states of tension or depression. Freud (1936: 1969) contributed much to our present understanding of the anxiety phenomenon. He recognized anxiety to be an unpleasant emotional state experienced in response to a particular threatening situation. He believed excessive anxiety to be the central problem in neurosis; however, of a more general importance he viewed anxiety as being vital to the development of a complete theory of human behavior.

A widely accepted definition of anxiety is provided by Spielberger (1966) when he proposed two types of anxiety: trait and state anxiety. Trait anxiety (A-trait) is a predisposition to perceive certain situations as threatening and to respond to these situations with varying degrees of state anxiety. Spielberger (1966: 17) defines trait anxiety as:

> A motive or acquired behavioral disposition that predisposes an individual to perceive a wide range of objectively non-dangerous circumstances as threatening and to respond to these with state anxiety reactions disproportionate in intensity to the magnitude of the objective danger.

A-trait refers to individual differences in anxiety proneness and is obviously a relatively stable trait that can influence an athlete's overt behavior so that he or she perceives of various situations as threatening. On the other hand, Spielberger (1972: 39) conceptualizes

A-state as:

> A transitory emotional state or condition of the human organism that varies in intensity and fluctuates over time. This condition is characterized by subjectively perceived feelings of tension and apprehension and activation of the autonomic nervous system.

Situational anxiety or A-state is a fluctuating state which occurs as a consequence of an individual perceiving the situation as threatening. Such a state is normally accompanied by a variety of associated physiological reactions.

In this respect anxiety states are closely associated with the concept of *arousal*. Duffy (1962) repeatedly stressed that arousal or activation was an emotional expression which resulted in the actual release of stored energy in the organism through metabolic activity in the tissues. This state of energy mobilization could actually be measured along a unitary dimension ranging from deep sleep to high excitement and included all the components of emotional and drive states. Martens (1974) explains that although arousal is associated with A-state it can only refer to the intensity dimension of behavior, while A-state actually refers to both the intensity and the direction of behavior. State anxiety is produced by the perception of danger or any threatening situation and leaves the subject with unpleasant feelings. Anxiety in so far as it relates to arousal and activation can be a true indication of a general state of alertness.

Two other terms that frequently cause confusion are *stress* and *threat*. Threat is defined as the perception of psychological or physical danger. The subject perceives an imbalance between the environmental demand and his or her own personal response capability. The individual's subjective appraisal of a situation as being physically or psychologically dangerous is labelled "threat" by Spielberger. Lazarus et.al. (1952) suggest that threat is caused by the frustration of being denied interpersonal or intrapersonal goals and it is this feeling that causes anxiety states. As threat increases so too will there be increases in A-states.

The stress process takes place when a person perceives an imbalance between the demands of a particular situation and the response he or she is capable of making. McGrath (1970) conceptualized stress as a social psychological process and suggested that four events should be considered when examining stress.

1. The physical or social environment that places some positive demand on the individual should be considered.
2. The individual's perception of that demand and how he or she intends to respond to it must be examined.
3. It will then be necessary to observe the person's actual response to the perceived demand.
4. It will also be necessary to carefully view the consequence resulting from the response.

McGrath (1970: 20) states:

> Stress has to do with a (perceived) substantial imbalance between demand and response capability, under conditions where failure to meet the demand has important (perceived) consequences.

Spielberger (1972: 488) proposed a similar model of stress but refers to it as anxiety rather than stress. Stress is limited to:

> The magnitude of objective danger that is associated with the stimulus properties of a given situation. In essence, we propose that the term stress be used exclusively to denote environmental conditions or circumstances that are characterized by some degree of objective physical or psychological danger.

Stress is a stimulus which elicits threat and the immediate reaction is increases in state anxiety.

Both these models of the stress process appear to be similar, the only difference rests in the terms used to describe the process. Spielberger uses the term stress as a stimulus whereas McGrath refers to the stimulus as the objective demand. It should be noted that McGrath's model suggests the presence of an imbalance. This imbalance can be operative both when the demands are excessive and also when they are inadequate. This imbalance between demand and response capability Spielberger terms "threat".

Martens (1977: 9) combines the concepts of McGrath and Spielberger and defines stress as:

> The process that involves the perception of a substantial imbalance between environmental demand and response capability, under conditions where failure to meet the demand is perceived

> as having important consequences and is responded to with increased levels of A-state.

An obvious relationship exists between the stress process and competition. In sport the athlete experiences and evaluative process through competition itself and where there is evaluation there is likely to be stress especially when the outcome is all important. Martens (1976: 14) describes competition as:

> A process in which the comparison of an individuals' performance is made with some standard in the presence of at least one other person who is aware of the criteria for comparison and can evaluate the comparison process.

Martens (1975) proposes an interesting model of competition which appears to draw upon the best of the McGrath and Spielberger models considered earlier. His model has four components which comply to the trait-state theory of Spielberger. The first component of this competitive process is the *objective competitive situation*. It defines all the objective stimuli that may elicit A-states including the nature of the competitive task, the ability of one's self compared to one's opponents, the available rewards, and the presence of significant others. It specifies the environment and the objective demand which may or may not contain the sources of threat, and so lead to unpleasant A-states especially if failure is anticipated. Secondly, the *subjective competitive situation* refers to how each athlete perceives, accepts, and appraises the competitive situation. Attitudes, abilities, personality dispositions and other intra-

personal factors will determine whether an athlete will view a particular situation as threatening or not. To understand the behavior of the athletes it is vital for the coach to appreciate how they can each perceive of the situation so differently. The *response* to the objective competitive situation will depend on the subjective situation but each athlete can respond at three levels by firstly performing the task well (behavioral response), by reacting to the impending competition with increased heart rate, sweating, etc. (physiological response), and finally by increasing the anxiety states (psychological response). The *consequences* are of importance to the athlete and these are generally expressed in terms of success and failure and maybe tied in with rewards.

Martens recognized that a situation specific competitive A-trait existed within the general construct of anxiety and went on to develop a valid and reliable instrument to measure it. Similarly, in extending Spielberger's trait-state theory it was an easy step for Klavora (1974: 22) to propose the existence of a competitive A-state which he defined as:

> A transitory anxiety experienced by athletes before and during athletic competition which is subjectively characterized and consciously perceived by feelings of tension, apprehension, and activation of the autonomic nervous system.

Competition gives rise to all manner of emotional states but notably states of anxiety. It is a specific situation that has the unavoidable potential for evaluation. Inherent in all evaluative

situations is the stark possibility of failure as reflected in the athlete's inability to meet the demands of the evaluative situation. Competition in so far as it includes evaluation will provide the athlete with varying degrees of stress especially if the outcome is felt to be important and natually the athlete will respond with varying states of anxiety. A limited or excessive response of anxiety states may mean the difference between a successful or a poor performance.

The purpose and need for this study

There is very little factual information regarding psychological consequences of participating in competitive swimming. Some popular literature warns of the dangers of psychological stresses which can be the result of intense competition especially among young swimmers but the views expressed are not the result of empirical investigation. There is no doubt that competitive swimming like many other sporting or non-sporting activities can precipitate extreme states of anxiety. A limited number of studies have concerned themselves with examining the personality traits of athletes including competitive swimmers, (Ogilvie, 1968) while others have concentrated on swimmers in particular (Kane, 1964; Rushall, 1967). Both Lampman (1968) and Tattersfield (1972) attempted to measure trait anxiety among swimmers and Griffin (1971) included swimmers in her study of anxiety states among female athletes across eight different sports.

Finally, Apitzsch (1975) and Harris (1975) attempted to examine swimmers' anxiety states in differing competitive situations but their results are far from conclusive because of their relatively small samples.

The first purpose of this preliminary investigation is to examine the competitive anxiety trait scores taken from a cross section of male and female competitive swimmers of different age and of mixed ability in Alberta. As the Sport Competition Anxiety Test will be the instrument used for obtaining the anxiety data it will be possible to compare the trait data of the male and female swimmers to the published norms provided by Martens (1977, p. 95) and so determine whether competitive swimmers are more or less anxious prone than other sportsmen. A second purpose of this study is to examine the A-state scores of a smaller group of mixed ability competitive swimmers across three different levels of competition. The measuring instrument in this case is the State-Trait Inventory of Spielberger (1970). The A-state data dervied across three different levels of competition will be analysed to determine whether any significant differences exist as a function of age and sex. Finally, the correlation between A-trait and A-state scores taken in three competitive situations will be examined to ascertain whether those swimmers high in A-trait tend to respond with high anxiety states while those with low A-trait are given to respond with low A-states in competitively threatening situations.

In the preceeding research related to competitive swimming and anxiety both the results and the methods by which they were obtained leave much to be desired. The confusion exists because the measuring instruments were not really specific enough to identify competitive anxiety in a competitively stressful situation. Research conducted specifically with swimmers is very limited. In recognizing the state-trait theory of anxiety as proposed by Spielberger (1966), the swimmer is seen as being temporarily influenced by feelings of anxiety which are characteristic of him or her as a person and by transitory feelings of apprehension, which are the direct result of a threatening competitive situation confronting him or her at any particular moment in time (state anxiety). That is, the anxiety states a swimmer experiences in competition are a function of his or her predisposition to be anxious (trait anxiety) and the severity of the competitive situation itself. A highly experienced swimmer with normally low A-trait and one who gives the appearance of being emotionally stable may find that he or she is extremely tense or high in A-state prior to a major competition. Similarly, highly strung swimmers may appear to be quite unaffected by tension immediately before major competition. Early research favored the hypothesis that low A-trait people tend to be low in A-state in competitive situations and vice versa, but this whole question is in need of further examination.

However, it is important for the swimming coach to know

whether swimmers are high or low in trait anxiety and how they tend to respond in stressful situations. Similarly the coach should know if there are different trait patterns between male and females and at different age levels. With sufficient data it may even be possible for the coach to predict performance in given situations.

Presumably, the more trait and state competitive anxiety information that can be gathered and accurately analyzed, along with the coach's own observation of each of his swimmers in competitively threatening situations, the more likely the coach will be able to assist that swimmer to attain their true performance potential.

The hypotheses:

The hypotheses tested at the .05 level in this study were:

#1. That a significant difference in competitive trait anxiety would exist:

   a. Between male and female swimmer with the female competitive swimmers tending to score higher than males.

   b. Across recognized age groups with trait anxiety increasing with age.

#2. That no significant differences would exist between the competitive A-trait scores of swimmers and the norms of other athletes as provided by Martens (1977.95)

#3. That state anxiety scores would increase with an increasing

intensity in the level of competition. The level of competition would significantly interact with both age and sex in influencing the state anxiety of the competitive swimmers.

#4. That competitive swimmers high in A-trait will also be high in A-state and those who are low in A-trait will tend to be low in A-state (i.e. that a significant correlation between A-trait and A-state will exist in competitive swimmers.)

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

Anxiety is related to many areas and disciplines and is closely tied to such concepts as arousal, stress, threat and fear. Consequently there is a mass of empirical literature pertaining to the concept and few genuine attempts have been made to integrate the theory and research by leading authorities. This has led to a number of serious problems which are evident in the literature. Most research is equivocal and Martens (1971) points to definitional inadequacies and the absence of a sound theoretical framework as the main obstruction to understanding. Spielberger (1972) regards anxiety as a concept that has both phenomenological and physiological properties and one which is concerned with complex qualitatively different feelings, states or conditions when in anticipation of a threatening situation.

Anxiety as a physiological phenomenon

Anxiety in so far as it relates to arousal was first measured in physiological terms. Duffy (1957), whose contribution marked the beginning of arousal theory, concentrated on physiological measures like increased muscular tension, heart rate, galvanic skin response, palmar sweating, increased respiratory rate, blood viscosity

and pressure increases, etc. In response to competition it was felt that the athlete needed to attain his or her optimal level of arousal in order to compete well (Oxendine, 1970). The pioneer experiments of Hans Selye into man's adjustment to stress were invaluable and took on an added meaning for sport when research was directed at assessing and measuring the physiological adjustments of an athlete to competitive stresses. The tendency at this time was to equate the psychological phenomena of ill feelings, tension, apprehension and anxiety states with the physiological but these psychological barriers were not too closely examined. Though the early work of both Duffy (1957), who considered arousal from a physiological stand point, and Malmo (1959) who looked at activation as a neuro-psychological dimension, are of interest, researchers eventually turned their attention to anxiety, its measurement and its influence upon a person's overt behavior from a purely psychological stand point.

The trait inventory approach

Almost all early sport personality research favored the trait approach, which suggests that personality traits directly influence behavior with very little concern for the situation. The factor analytic studies of Cattell and his followers led to the identification of two different anxiety factors which Spielberger later defined so clearly. However, anxiety was originally conceived as a stable and unitary phenomenon and it was assumed that an

individual reacts to all types of threatening situations in more or less the same way.

The situational approach

In reaction to the trait approach personologists like Mischel (1973) advocated a situational paradigm. For the situationalist the study of anxiety should commence with an in depth examination of particularly stressful situations. A reflection of this approach is the work of Sarason et al. (1960) which did not regard anxiety as a unitary construct but rather as one possessing multidimensional properties. It was believed that while a general anxiety trait may exist is should be viewed as a strong learned drive which is situationally evoked. It should be noted too that situation specific A-trait measuring instruments have been found to possess superior predictive abilities when compared to general A-trait scales (Mellstrom, Cicala and Zuckerman, 1976; Watson and Friend, 1969). More recently Wine (1971) has advocated a cognitive or attentional interpretation of anxiety. According to this perspective performance is impaired primarily because a person cognitively attends to the wrong things.

The interaction approach

A final and probably the best theoretical position is that posed by the interactionists who state that both the person and the situation are important co-determinants of behavior. They believe

in the existence of traits but more or less regard them as predispositions to perceive and respond to certain situations with certain behaviors. If a person has a strong predisposition to be anxious then he or she will behave in an anxious way in a threatening situation.

Because the literature can be reviewed from these three differing stand points it is easy to understand why so many definitional inconsistencies surround the construct of anxiety. Confusion was fostered because psychologists failed to distinguish between anxiety as a relatively enduring trait and anxiety as a transitory state. Spielberger's recent state-trait theory affords a much more consistent view of anxiety. At the same time research results proved contradictory because the validity of the measuring instruments was always in question. Cattell (1966) has suggested that there was a lack of valid and reliable instrumentation in the early stages of anxiety research and uncertainty existed as to whether instruments which purported to measure anxiety actually assessed the general tendency to be anxious or only considered immediate states of anxiety in a particular situation. Sarason (1960) also discussed the theoretical problems associated with the use of anxiety scales, and further difficulties were reviewd and critically discussed by Levitt (1967).

Anxiety and motor performance

The early studies that devoted their attention to anxiety and sport were concerned with the effects of anxiety on motor performance. But the term 'motor performance' was somewhat constricted and of the many motor tasks employed some appeared to be predominantly motor while others were only marginally motor and tended more to emphasize the perceptual and cognitive processes. Weinberg (1977: 132) states:

> The major criterion for measuring motor behavior is an assessment of the end product rather than the quality of movement.

In competitive swimming it is relatively easy for the coach to assess the end product through the use of a stop watch. However, to improve performance it is the quality of movement leading up to and including the performance that needs to be investigated, and anxiety states in so far as they directly affect this quality of movement must be of particular concern to the coach. Recent work by Weinberg and Hunt (1976) and Weinberg (1977) to investigate whether differences in anxiety levels are reflected in electromyographic recordings during performance may provide the coach with very valuable information in the not too distant future. Weinberg is critical of many of the existing instruments used to measure anxiety and notes (1977: 132):

> Besides other limitations these measures only show increases or decreases in A-state and nothing about the quality of neuromuscular patterning of the movement.

Most research pertaining to anxiety and motor performance in the field of sport can be summarized in two questions. In trait-state terminology the questions ask:

How do A-trait and A-state affect performance?

How does sport affect A-trait and A-state?

The answers to these questions depend very much on the researcher's perspective of anxiety. The early sport personality studies compared the traits of athletes engaged in one sport with those of another to ascertain whether intensity differences in A-trait existed. The most common measuring scales were the Taylor (1956) Manifest Anxiety Scale (MAS), Cattell's (1957), IPAT Anxiety Scale and later the Cattell and Scheier (1960) IPAT - 8 Parallel Form Anxiety Battery. The anxiety scales from other more general personality instruments such as the Edwards Personality Preference Schedule (EPPS), and the Minnesota Multiphasic Personality Inventory (MMPI) were also used by some sport researchers. The inventory approach concentrated on determining whether athletes were more anxious than non- athletes, or whether a higher or lower anxiety level is a prerequisite for superior performance, or if participants in one sport are more or less anxious than those in another sport. Ogilvie (1968) concluded that athletes do have a unique and identifiable personality profile which tends to show the superior athlete possessiong lower levels of A-trait and a greater resistance to emotional stress when compared to the less capable athlete or the non-athlete. Ogilvie failed to

qualify this statement for any specific sport or sex. Hardman (1973) concluded that most athletes have similar A-trait levels to the general population and that if anything top class athletes are lower in A-trait. It may be that superior athletes have lower levels of anxiety, and Warburton and Kane (1966) indicated that a high physical ability tends to reduce the unitary trait anxiety. There is little further evidence to support this thinking and in fact most of the research results of the time (1960's) were confusing and contradictory. For example studies like those of Morgan (1970), Lampman (1967), Langer (1966) and Newman (1967) used the IPAT scale as a measure of state anxiety when really it is a trait measure. These researchers all found that anxiety measures increased as significant competition approached even though inventories designed to assess relatively stable personality traits were used to measure the emotional reactions of the athlete. Ogilvie (1968) and Cooper (1969) provide good reviews of the literature related to the trait inventory approach but Martens (1977) suggests that any research that employed these scales as state measures should be viewed with skepticism.

Before proceeding to examine current research in light of the more suitable state-trait approach, no review of the literature would be complete without a brief consideration of two very important theories that have been very persuasive in the research. These two dominant theories have been labled *drive theory* and the *inverted-U hypothesis*.

Drive theory

A considerable number of investigations concerned with arousal or state anxiety and athletic performance have been formulated in terms of the Hull-Spence drive theory. The basic prediction of drive theory postulated by Spence and Spence (1966) simply states that performance is the product of habit and drive. Habit refers to a hierarchical order of correct and incorrect responses. Drive theory suggests that increases in drive will increase the probability of emitting the dominant response. In the early stages of [redacted]erforming or learning a simple skill, the dominant response is more likely to be an incorrect one. It is not until the athlete has learned the appropriate way to deal with the competitive situation that the correct response will gain ascendency in his task relevant behavioral repertoire. An increase in drive in the early stages of learning is more likely to impair performance until such times that the athlete has mastered the skill and experienced the correct responses. As figure 1 (p. 27) illustrates, drive theory tends to predict a linear relationship, either positive or negative, between anxiety and performance. It should be stated in fairness that the originators of this theory were not really concerned with motor behavior but rather with very simple learning tasks. The application of drive theory to motor behavior and performance became the prerogative of the physical education researchers. Generally speaking, investigations following this theory attempted to test various hypotheses in so far

as they related to classical conditioning and certain kinds of simple learning. It was the application of drive theory to complex motor behavior that led to controversy and confusion. There is considerable experimental support for the early studies that involved very simple tasks but this is not a truly realistic situation in human motor behavior. When Hull's theory was extended to more complex motor behavior it was with less satisfactory results. But according to Spence (1966) the increased drive associated with high anxiety levels increases the likelihood of the dominant response occurring. She concluded that while the performance of a high anxiety group would be inferior to that of a low anxiety group in the inital stages of learning it would become superior in the later stages.

Martens (1971) performed an extensive review of the anxiety and motor performance literature. He concluded that most studies concerned with the effects of anxiety as a trait especially when measured using MAS in the absence of a stressor are inconsistent. Hammer (1969) compared anxiety and performance across ten sports, including competitive swimming, in order to ascertain whether certain levels of anxiety can help predict performance. The researcher endeavoured to establish whether achievers in these sports were more or less anxious than 'mere' participants or even non-participants. The findings revealed no significant difference between these groups and Hammer (1969.3) was left to conclude that:

> Reasonable doubt could be presumed when attempting to hypothesize Hullian theory to sports performance.

Carron (1971) questions the possibility of establishing a hierarchy of habits when these of necessity should constantly change with learning and experience. What kind of valid conclusions can be drawn from experiments conducted in the absence of a stressor, or is it even a satisfactory procedure to allow the stressor responsible for increases in anxiety to be artificially induced into the situation? For example, the predicted interaction between anxiety and audience presence as a stressor could not be satisfactorily interpreted in terms of drive theory in the research of Martens (1969) or Wankel (1977). Probably it is not possible to test the theory accurately until the habit hierarcy of various motor tasks is fully understood. Inspection of the extensive literature certainly illustrates the many inconsistencies though it is certain that the stressors employed were actually effective in eliciting anxiety states. Despite loud protests from Janet Taylor Spence (1971) it is not really too surprising that Martens (1971. 167) concludes:

> Based on the experimental evidence and the inability to accurately determine habit strength, it is not difficult to recommend that drive theory be abandoned and that other theoretical approaches be considered.

Though drive theory may have had positive value in terms of simple conditioning and verbal learning tasks it would appear to have contributed little to a better understanding of motor behavior

(Bolles, 1967).

Inverted-U hypothesis

An alternative hypothesis to drive theory is the inverted-U hypothesis which has been attributed to the research of Yerkes and Dodson (1908). The suggestion here is that there is an optimum physiological arousal level of the organism for performance. As tension or anxiety rises from minimal to moderate levels, behavioral efficiency or performance improves, but as tension or arousal continues to arise beyond an optimal level then behavioral efficiency decreases. This suggests a middle range of arousal which is associated with the best kind of performance. There is plenty of experimental evidence since the early work of Duffy (1962) and Malmo (1959) suggest that the relationship between drive and performance is curvilinear or nonmonotomic. Martens and Landers (1970) tested the inverted-U hypothesis among three trait anxiety groups identified by MAS both in the presence and in the absence of a stressor. Though the performance results failed to show any interaction effect between trait anxiety and stress, the inverted-U hypothesis was supported separately for three increasing stress conditions and three increasing levels of trait anxiety. The authors concluded that it is difficult to account for the anxiety and stress effects. This research is a clear example of major inconsistencies that can appear

DRIVE THEORY AND THE INVERTED-U HYPOTHESIS

The Relationships between Arousal and Performance

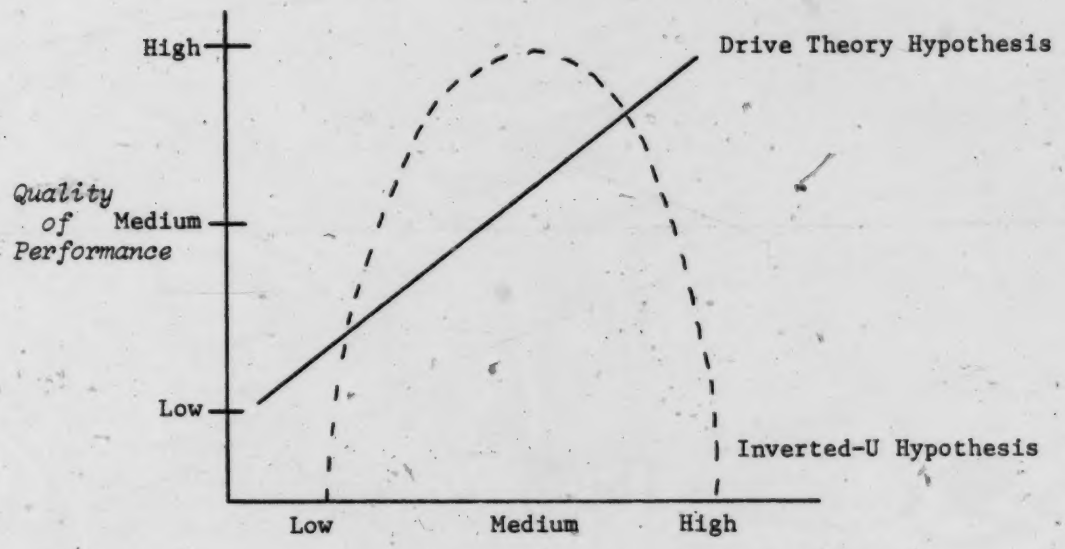

Figure 1

even in the same piece of research and obviously further study is required.

Good reviews of this early literature are provided by Lazarus, Deese and Osler (1952) and Broadhurst (1959) but there are few studies that have attempted to investigate the relationship between subjects who vary in trait anxiety and exhibit changes in arousal or anxiety states in the face of competition. Methods are suspect not only because researchers failed to use an accurate measuring instrument and invariably ended up measuring general trait anxiety rather than state anxiety, but also because the experimental

anxiety stress conditions employed invariably fell short of simulating the competitively stressful conditions that would be experienced in the pre-competitive situation by the athlete. In addition the difficulty of measuring precise points along the arousal continuum will always present difficulties. Though the inverted-U hypothesis has received enthusiastic support it is not as a consequence of any real experimental research or irrefutable evidence but probably because it is an attractive explanation at the intuitive level.

To this point much of the knowledge that the coach has obtained about anxiety has been made available from a fairly extensive research activity into the subject in so far as it is related to important issues like general learning ability (Mandler & Sarason, 1952), or complex learning (Katahn, 1966), academic achievement or its effects upon levels of intelligence (Gaudry and Spielberger, 1970). More recently, researchers have attempted to show the effects of anxiety on the progressive learning of motor skills (Morris et. al., 1975), whether these skills are relatively simple (Carron, 1971) or complex. (Hollingsworth, 1975). The effects of success and failure upon motor performance (Martens, Gill and Scanlan, 1976) or the influence of a perceived threat in a competitive setting (Scanlan & Passer, 1977) should provide the coach with interesting findings of a general nature.

State-trait theory

To obtain more accurate information about anxiety and its effects upon performance it would be necessary to design a reliable and valid instrument that would seek to assess both dispositional A-trait and situational A-state independently. Spielberger, Gorsuch and Lushene (1970) produced such an instrument - the State-Trait Anxiety Inventory (STAI). Spielberger attempted to integrate Cattell and Scheier's concept of anxiety with the phenomenological experience and he especially attempted to consider stressor stimuli that evoke different levels of anxiety states in persons. According to Spielberger (1972) the level of A-state will be determined by circumstances that are perceived by an individual to be threatening, irrespective of objective danger. A-state is characterized in the first instance by the intensity of anxiety as an emotional state at a particular moment in time. A-trait is a disposition to respond with certain levels of A-state in situations which are believed by the individual to be threatening or too demanding, likely to cause failure or loss of esteem. Spielberger (1966) notes that most of the experimental literature on anxiety postulates that situations that impose direct or implied threats to self esteem produce differential levels of A-state in persons who differ in A-trait. Another of Spielberger's hypotheses proposed that high A-trait subjects tend to regard more situations as threatening than do low A-trait subjects. He also felt that it was possible for a person to quickly perceive

and appraise a threatening situation through ability and past experiences. It may be possible for a person to develop effective coping responses which may help him or her to control and even reduce any unpleasant levels of A-state. The implications of this in the sporting context and more specifically in the final stages of race preparation are more than significant. Applying state-trait theory will allow us to conceptualize an athlete with high A-trait not always being threatened by a competitively stressful situation precisely because he or she is able to cope with and control the event so that the success of the final performance is not jeopardized. In a similar situation a low A-trait athlete may feel completely threatened and be unable to control his or her anxiety states and so end up with a disastrous performance.

The impact of any given situation on the intensity of A-state can only be established by obtaining accurate measurements in that situation. Spielberger's anxiety trait scale is designed to measure levels of general anxiety which is a tendency to become aroused in a wide class of situations, whereas the state scale measures how one feels in this situation. Speilberger's STAI has led to a mass of anxiety research in recent years.

Using this state-trait approach, Burton (1976) set out to establish whether different types of physical education evoked differing levels of anxiety, whether physical education learning environments had differing effects on high or low anxious subjects

and whether a relationship between anxiety and level of movement satisfaction was evident. Her results showed no appreciable differences in A-trait levels among athletes from different sports but there were significant changes in A-states and particularly among athletes involved in individual sports compared to team sports. She discovered that as anxiety levels increased the level of movement satisfaction tended to decrease. Spielberger's hypothesis that in situations involving the evaluation of personal adequacy high A-trait subjects will react with higher levels of A-state than will low A-trait subjects was supported.

Griffin (1971) directed her research exclusively at three different age groups of women athletes involved in eight different sports including competitive swimming. She attempted to provide clear descriptive data of differences in A-trait using STAI and to measure the tendency to become aroused in a wide variety of sporting situations. Her study suggests the possibility of A-trait differences among athletes competing in individual sports when compared to athletes competing on teams. Athletes competing in individual sports like gymnastics and swimming tended to be more anxious. Both A-trait and A-state scores differed significantly among the age categories identified and tended to decrease as age increased. However, the effects of age upon trait and state anxiety were not consistent in all sports and obviously further investigation would be of interest.

Slevin (1970) also used the STAI to examine the effects of

anxiety upon the performance of a novel gross motor task. The results indicated high trait anxiety subjects had significantly higher state anxiety scores and significantly lower performance scores than low trait subjects.

Competitive state anxiety

To this point few researchers had attempted to measure anxiety in the pre-competitive situation though some sports psychologists like Johnson (1951), Tutko (1971), Singer (1972), Cratty (1973), and Alderman (1974) did generalize that pre-competitive anxiety levels must affect performance but little investigative work was attempted. The important question of interest was whether any changes in anxiety states could be detected during the competitive process. Klavora (1974) aimed to investigate the effects of athletic competition on what he termed pre-competitive anxiety states and he asked the question whether A-trait is a predictor of pre-competitive A-state. He examined athletes in different sports and during different levels of competition. His study produced some practical findings of value to the coach. State anxiety increased considerably through the season and subjects with high A-trait levels exhibited significantly higher state anxiety than low trait subjects. Contrary to the conclusions of Griffin (1971) he found few differences in the anxiety state scores of athletes of one sport compared with those of another or in the elevation of A-states of athletes involved in team sports

compared to those athletes concerned with individual sports. Some aspects of his study, notably with the basketball players, indicated a curvilinear state anxiety - performance relationship and so favored the inverted-U hypothesis. Klavora claimed that his data supported Spielberger's state-trait theory of anxiety. This seems debatable for his high and low anxiety subjects manifested equal increases in A-state from practice to game situations rather than indicating higher increases in A-states for high A-trait subjects when compared to the A-state increases of the low A-trait participants in the game situation. Martens (1977) indicated that this study had methodological problems. Klavora used Spielberger's general A-trait inventory which has subsequently been shown to be an inferior predictor of pre-competitive A-state when compared to SCAT (Martens and Simon, 1976).

Competitive trait anxiety

Martens (1977) developed the concept of a sport specific competitive A-trait. Competitive A-trait refers to relatively stable individual differences in the disposition or the tendency to respond with elevations in A-state in a particular competitive situation. It is a construct that describes individual differences in the tendency to perceive competitive situations as threatening and to respond to these situations with A-state reactions of varying intensity (Martens et al., 1975). Whereas Spielberger's trait measure of anxiety assessed a general tendency to be anxious, Martens' (1977) competitive trait

anxiety instrument which he called the Sport Competition Anxiety Test (SCAT) measured a sports specific anxiety trait. His approach to studying A-trait was based upon the superior predictive power of situation specific instruments, the development of a conceptual model for studying competition, the interaction paradigm for the study of personality and the state-trait theory of anxiety (Simon, 1977). SCAT was carefully developed, in both child and adult form, by modifying the best items from Taylor's MAS, Spielberger's STAI and Sarason's GAS to produce a reliable and valid measuring scale which was successfully employed in early experiments (Martens and Gill, 1976,: and Scanlan and Passer, 1977). The concurrent validity of SCAT was examined by correlating it with other anxiety scales in a series of laboratory and field investigations (Simon and Martens, 1977). The predictive validity of SCAT was demonstrated in a study by Martens et al. (1975). In another study SCAT predicted pre-competitive A-state levels of female basketball players ($r = .64$) considerably better than did Spielberger's trait scale ($r = .30$) or the coaches' subjective estimates of their players trait anxiety ($r = .12$). Simon (1977) researched A-state differences in boys aged nine to fourteen years engaged in required school activities, non-required, non-sport school activities and non-school sports activities. Her findings demonstrated that A-state levels are no greater in sports activities when compared to non-sport activities and that no significant differences exist among age groups. Simon concluded that two major factors influence

A-state levels:

1. The first is the importance of the outcome of the activity.
2. The second is the opportunity for evaluation.

To date then, promising results have been obtained using SCAT, however, only through additional research will the true merits of the scale be unveiled. If in the future, the relationship between A-trait, A-state and performance can be established then coaches will be in a better position to more affectively assist athletes in preparing for competition. At present research appears to be able to offer little that can contribute to the insight of the coach about the relationship between A-state and sport performance.

Anxiety increases as a function of age

A limited amount of literature dealing with developmental aspects of anxiety has indicated that anxiety increases as a function of age. The normative data for Sarason's Test Anxiety Scale for children (Hill, 1971), Spielberger's State-Trait Anxiety Inventory for children (Spielberger, 1973) and the Sport Competition Anxiety Test (Martens, 1977) all show that anxiety increases with age. Few researchers have examined the relationship between age and and anxiety within the sporting context. Griffin (1971) tested female athletes in three different age categories - twelve and thirteen years, sixteen and seventeen years, and nineteen years and over. She found that the second category (16-17 years) manifested the highest levels of A-trait

and the nineteen years and over registered the lowest. Spielberger's and Martens' normative data do however, suggest a linear relationship between age and A-trait.

Anxiety increases as a function of sex

Finally, few investigations exist which demonstrate how the relationship between A-trait and motor performance differs for males and females in competitive situations. Both Griffin (1971) and Burton (1976) used female athletes in their research already cited. Horner (1974) suggests that females do tend to respond differently than males in achievement situations and exhibit higher anxiety states. In a relatively early study Bradford (1968) concluded that females are higher in loss of love anxiety than males and anxiety is generally higher in the expression of social fears, whereas males exceed females in the expression of physical fears or anxieties. The SCAT norms do indicate that females tend to score higher than males (Martens, 1977: 95, Table 26). Martens et al. (1976. 1203) comment:

> If indeed females are more anxious about competitive situations it is plausible to expect those females who are high in competitive A-trait to be more adversely affected by the competitive conditions.

Anxiety research and competitive swimming

It now remains to briefly consider the relevant anxiety research as it relates to competitive swimming. Exclusive studies are very limited in number though competitive swimmers were included

in certain investigations along with athletes from other sports. Lampman (1967) studied the effects of anxiety upon the competitive performance of fifteen male Florida University swimmers. He investigated whether NCAA national qualifying team members responded differently in terms of anxiety than did non-qualifying team members. Lampman used the IPAT-8 Parallel Form Anxiety Test Battery to identify high and low anxious subjects. The swimmers were tested repeatedly throughout the season. Lampman found that anxiety increased as the season progressed towards the national championships but that the qualifiers did not differ significantly in regard to anxiety levels from the non-qualifiers. He concluded from his results that intense anxiety is likely to interfere with performance whereas some increases in anxiety will facilitate performance. Again, swimmers experiencing low levels of anxiety in non-competitive situations may perform best if their pre-meet anxiety is relatively low, while swimmers who are highly anxious in non-competitive situations tend to perform better if their pre-meet anxiety levels are relatively high. Unfortunately, Lampman's study was deficient in so far as he used a trait measuring instrument and then proceeded to draw conclusions about anxiety states, a common mistake among researchers at this time. From a practical point of view Lampman's study can only suggest that more research should be undertaken to ascertain whether top class performers differ in their response to threatening situations when compared to the less successful athlete. His conclusions indicated the need for each

swimming coach to treat their athletes on a very individual basis when aiming to arouse and control emotional states.

Tattersfield (1972) conducted a three year longitudinal study of a sample of age group male swimmers and a control group of non competitive swimmers. He aimed to establish whether participation in competitive swimming made one more or less anxious. The results indicated that there was a drop in A-trait levels, though not a significant one, among the competitive swimmers over time when compared to the control group. Other than to chance itself, perhaps this drop could be attributed to either participation in competitive swimming, or to a selective process attracting only boys with lower levels of anxiety trait. He even suggested that exposing swimmers to stressful situations within competition affords them the opportunity of learning how to cope with anxiety.

Apitzsch (1975) set out to determine whether a significant relationship existed between selected measures of anxiety recorded during a pre-competitive phase and those taken just prior to a performance at national or championship level. At the same time fluctuations in state anxiety levels as assessed by Spielberger's STAI were recorded. His results collected from eight male university swimmers could be tentatively interpreted as indicative of the specifically of optimal anxiety levels for different individuals and agreed for the most part with those of Lampman (1967). Unfortunately, both the Apitzsch and the Lampman studies lacked the

strength of numbers to be convincing. Misner (1973) on the other hand observed fifty four male swimmers to see whether two types of competition - with self and against others - affected anxiety levels over two racing distances namely the 50 yards freestyle and the 200 yards freestyle. The major finding of this limited research work was that both low and medium anxious swimmers as identified by MAS tended to improve their performances when in competition with others over a distance event, whereas high anxious subjects suffered a performance decrement during competition.

Harris (1975) investigated the A-states of young male and female swimmers taken prior to training and before competition. She employed STAI and when comparing the pre-training and pre-competition scores; A-state levels were significantly higher for both boys and girls in the pre-competition situation but when separated by sex there were no significant differences between the A-states of training and competition for the girls but the boys showed slightly higher A-state scores for the pre-competition measurement. Harris rationalized this difference by pointing out the necessity for boys to receive approval from their peers in sporting situations during childhood and adolescence and obviously they would be concerned about failing to perform up to their expectations or the expectations of significant others. She suggested that girls feel no such pressures to succeed, and consequently experience lower pre-competitive anxiety states. Harris failed to state how significantly threatening for both boys

and girls was the selected pre-competitive meet, as this would have had tremendous bearing upon the A-state scores.

Focus of future research

In conclusion, the focu of future research should be directed at pin pointing the major stimuli or antecedent conditions that evoke A-state among athletes, on the cognitive processes that interpret these stimuli as threatening or dangerous and on the behaviors that are elicited in response to the perceived threat. The efforts of Spielberger and Martens to identify and measure competitive anxiety in more precise terms has opened the door to a more practical line of research which may allow for better and more reliable predictions about performance and behaviors. In competitive swimming it may prove worthwhile to follow the recommendations of Apitzsch (1975: 55):

> That in future studies the state anxiety level be sampled immediately preceding each event. Repeated measures of state anxiety compared with measures of performances could reveal important clues concerning optimum anxiety levels for different swimmers and events. Studies along these lines could further determine if there is a general difference in state anxiety levels for different distances in swimming competition.

CHAPTER III

METHODS AND PROCEDURES

The Subjects

The first part of this study is concerned with measuring competitive trait anxiety among competitive swimmers from the top six swimming clubs in Alberta. One hundred and thirty seven male competitive swimmers registered with the Canadian Amateur Swimming Association in the province of Alberta along with one hundred and thirty eight females were tested. Their ages ranged from eight to twenty four years of age. The swimmers were of mixed ability in terms of swimming success and included both nationally and provincially successful performers as well as swimmers who competed at a lower level of competition. The subjects were conveniently divided into recognized swimming age groups - ten years and under, eleven to twelve years, thirteen to fourteen years, fifteen to seventeen years and eighteen years and over. The last group was mainly comprised of college swimmers from the Universities of Alberta.

For the second part of the investigation which is concerned with evident changes in state anxiety at three different levels of competition, the measurements were confined to a smaller cross section of competitive swimmers from one of the Alberta swimming clubs. It was necessary to restrict the sample of subjects in this way in order to better control the accuracy of the state anxiety measures taken

in three different competitive situations. The total number of male and female subjects examined was sixty nine, comprised of thirty nine female swimmers and thirty males. Again this group was divided into four recognized age groups - ten years and under, eleven to twelve years, thirteen to fourteen years and fifteen years and over.

Experimental design

In the first part of this study, descriptive statistics on the SCAT scores of Alberta competitive swimmers (N = 275) will provide the basis for some exploratory comment. Separate one way analyses of variance will then be performed on the trait data for the male and the female swimmers to determine if there are significant age group differences within the two sex groups. If a significant difference is evident then multiple range tests will be performed to ascertain whether this significant difference exists among age groups and within sex for male and female swimmers separately.

Finally, it is hoped to perform a series of tests between the population norms provided by Martens (1977) and the sample means for all age groups within sex. If a significant difference is evident then it remains to conduct an overall ANOVA comparing sample means and standard deviations with the norming population. All analyses will be performed using the SPSS package (Version 7) 1977.

In the second part of the thesis where state anxiety is to be examined at three levels of competition, a three way ANOVA with

repeated measures on the third factor - i.e. - the levels of competition will be performed to ascertain whether there are significant effects due to the independent variables of age, sex, and levels of competiton. If an overall difference is evident then multiple range tests will be conducted on age and levels of competition where appropriate.

From the information gathered group cells of individuals that are statistically not different from one another will be identified if necessary to allow correlations to be performed on these groups to ascertain whether those high in trait anxiety are correspondingly higher in state anxiety and those low in trait anxiety are equally low in state anxiety. Again, all statistical analyses will be performed using the SPSS package (Version 7) 1977.

The Instruments

The Sport Competition Anxiety Test (S.C.A.T.) as devised by Martens (1977) was administered individually to two hundred and seventy five registered competitive swimmers during the off season. The adult form A (see Appendix 5, page 84) was given to swimmers of fifteen years and over while the children's form C (see Appendix 6, page 85) was administered to swimmers of fourteen years and under.

SCAT is an A-trait scale designed to measure the predisposition of each subject to respond with varying levels of anxiety states in a competitive sports situation. It is a pen and paper test comprising of fifteen questions designed to ascertain how each subject

generally feels about competing in sport. The usefulness of SCAT as a diagnostic instrument requires verification, but it is generally accepted that the assessment of anxiety levels through self-report indicates more about the competitor's general state of arousal than any other single or composite index of physiological measures.

The questionnaire is relatively simple to complete and of the fifteen questions, only ten are actually scored. Five spurious statements have been added to offset the chance of biased responses. The ten test items are 2, 3, 5, 6, 8, 9, 11, 12, 14, and 15. There are three possible responses to each item - (A) Hardly ever, (B) Sometimes, (C) Often. Questions 2, 3, 5, 8, 9, 12, and 14 are worded so that they are scored according to the following key:

Hardly Ever - 1
Sometimes - 2
Often - 3

while items 6 and 11 are scored slightly differently and as follows:

Often - 1
Sometimes - 2
Hardly ever - 3

The range of scores rests between 10 (lowest competitive A-trait) and 30 (highest competitive A-trait).

SCAT was chosen for this study because it is both simple and quick to complete and is "sports specific". After all the scores were collected they were tabulated and statistically analysed.

For the measurement of state anxiety in three different competitive situations the State-Trait Anxiety Inventory (Form X-1)

of Spielberger et al. (1970) was used. The A-state scale consists of twenty statements which can be quickly responded to in a similar manner to that described for SCAT indicating how the subject feels at the particular moment in time. The test is best administered to each individual roughly between ten and twenty minutes before their actual competition is due to start. The STAI X-1 form is included in Appendix 7, page 86. Researchers have been using the A-state scale of Spielberger to determine the actual levels of A-state intensity brought about by varying stressful competitive situations. It is generally accepted that A-state scores increase in response to various kinds of stress and decrease as a result of relaxation training techniques.

The range of possible scores for STAI Form X-1 varies from 20 to 80. The subjects respond to each item by rating themselves on a four point scale. These four categories are scored according to the following key. For items 1, 2, 5, 8, 10, 11, 15, 16, 19, and 20

Not at all - 4
Somewhat - 3
Moderately So - 2
Very much so - 1

while for items 3, 4, 6, 7, 9, 12, 13, 14, 17, and 18 the scores are reversed

Not at all - 1
Somewhat - 2
Moderately So - 3
Very much so - 4

The Procedures

STAI Form X-1 was administered according to the directions stated to each swimmer in three different competitive situations. The first measure was taken before a training practice, the second before an individually significant event in the club championships and the third before a major race considered to be very important for each individual swimmer. This last measure in fact was taken in a situation that was deemed by the coach to be more threatening to each individual than the club championships and was for most of the subjects administered in a dual meet situation, or alternatively before a major national or provincial championship event. Obviously it would have presented the researcher with a distorted picture should all three measures have had to be taken in the same competitive situation for all sixty nine swimmers, since for all swimmers competitive occasions are viewed differently. However, each test was given to the swimmer by the coach between ten and twenty minutes prior to the training session or competition itself. In the case of actual competition the test was given ten to twenty minutes before the swimmer's major event. Since the instructions were printed on the form, each swimmer was asked to read these very carefully and then to respond accordingly. After the three measures had been taken the scores were collected and tabulated and statistically analysed.

CHAPTER IV

RESULTS AND DISCUSSION

Results

The descriptive statistics for the SCAT scores of the 275 competitive swimmers categorized into recognized age groups are presented in Table 1.

Table 1. Descriptive Statistics for Competitive A-Trait Scores (SCAT) among Male and Female Age Group Swimmers.

	Male Competitive Swimmers				Female Competitive Swimmers			
AGE GROUP	$\bar{X}$	S.D.	VAR.	N.	$\bar{X}$	S.D.	VAR.	N.
18 +	20.71	4.23	17.94	45	22.68	4.18	17.49	28
15-17	21.36	4.43	19.66	25	22.81	3.57	12.76	21
13-14	18.62	4.51	20.33	26	22.37	4.11	16.91	43
11-12	20.04	3.87	14.95	23	21.04	3.76	14.11	28
10 -	18.00	4.07	16.59	18	18.61	4.37	19.08	18
Total	19.96	4.35	18.90	137	21.74	4.18	17.51	138

The results of a two way analysis of variance are illustrate in Table 2 (page 48).

It is evident from the results that a significant difference exists between the A-trait scores as a function of both sex and age. Female competitive swimmers tend to have higher competitive A-trait scores than males across every age group.

Table 2. Two Way Analysis of Variance Table of Competitive A-Trait Scores (SCAT) for Male and Female Age Group Swimmers.

Source	Sum of Squares	Degrees of Freedom	Mean Squares	F. Ratio
Sex	193.752	1	193.752	11.352*
Age	436.630	4	109.157	6.396
Sex-Age	75.948	4	18.987	1.112
S-Within	4522.975	265	17.067	

* Significant at 0.05 level.

Table 3 shows a one way analysis of variance of the competitive A-trait scores for the male swimmers according to age group.

Table 3. One Way Analysis of Variance of Competitive A-Trait Scores for Male Competitive Swimmers according to Age Group.

Source	Degrees of Freedom	Sum of Squares	Mean Squares	F. Ratio
Between Groups	4	190.688	47.67	2.6444*
Within Groups	132	2380.106	18.03	
Total	136	2570.794		

* Significant at 0.05 level

In recognizing a significant difference in A-trait between male and female swimmers the data was further examined for significant differences within the age groups considering first the male swimmers and then the female swimmers. Although an overall significant difference among the male age group swimmers was present, the multiple range test (Student - Newman - Keuls) indicated that there were no differences among the various male age groups. This may have been due to the range in size of the different male age categories.

Table 4 indicates the results of a one way analysis of variance of the competitive A-trait scores for the female swimmers according to age group.

Table 4. One Way Analysis of Variance of Competitive A-Trait Scores for Female Competitive Swimmers according to Age Group.

Source	Degrees of Freedom	Sum of Squares	Squares	F. Ratio
Between Groups	4	255.973	63.99	3.972*
Within Groups	133	2142.626	16.11	
Total	137	2398.599		

* Significant at 0.05 level

A multiple range test (Student - Newman - Keuls) was performed on the female competitive anxiety trait data to determine which age groups

differed significantly from one another. The female 10 years and under age group differed significantly from the other age categories. Female swimmers in this age group tend to show significantly lower competitive A-trait scores when compared to other age groups. The competitive A-trait data is tabulated in Appendix 1 (page 77) for the male swimmers and in Appendix 2 (page 78) for the female swimmers.

Table 5 summarizes the SCAT data collected for the male and female swimmers and affords a statistical comparison of these scores with those provided by Martens (1977, 95).

Table 5. Summary of SCAT Scores of Male and Female Swimmers compared to the Competitive Anxiety Norms of Martens (1977, 95).

		Male Competitive Swimmers			Female Competitive Swimmers		
		Sample	T-Value	Norm	Sample	T-Value	Norm
College	N	40		370	28		158
Age	$\bar{X}$	21.00	1.636	19.74	22.67	0.071	22.60
Adults	SD	4.10		4.68	4.18		4.87
10-12th	N	31		129	21		113
Grades	$\bar{X}$	20.77	0.909	20.03	22.80	0.570	22.22
	SD	4.57		3.94	3.57		4.40
7-9th	N	39		841	57		270
Grades	$\bar{X}$	19.47	0.198	19.32	22.26	2.633*	20.36
	SD	4.13		4.64	4.04		5.12
4-6th	N	27		237	32		241
Grades	$\bar{X}$	18.33	0.613	18.89	19.59	0.147	19.71
	SD	3.86		4.56	3.97		4.40

* Significant at 0.05 level

Before testing hypothesis #2 it was necessary to recategorize the SCAT data collected on the male and female swimmers according to the grades utilized by Martens (1977). Appendix 8 (page 87) lists the male and female SCAT scores regrouped according to the school grades of the subjects.

No differences were evident among the scores of the male swimmers when compared to the norms, but in the case of the females, a significant difference was detected between the sample mean of the 7-9th grade scores and the norm. The female 11-13 years age group scores were significantly higher for swimmers when compared to the norm for other athletes as provided by Martens.

Upon examining the A-state data of a much smaller sample of club swimmers (N = 69), Table 6 (page 52) indicates that there was no significant difference between the male and female A-state scores averaged across the three different levels of competition. But there was a significant difference in the A-state response of all swimmers taken at three different levels of competition. Both male and female swimmers responded with increases in state anxiety when faced with what was judged by the coach to be increasingly more threatening competitive situations.

However, a significant difference among the A-state scores was in evidence as a consequence of age, and this was apparent for all three levels of competition. Since a significant age by level of competition interaction was indicated a multiple range test (Student - Newman - Keuls) was performed to determine how the age groups,

irrespective of sex, differed within a given level of competition. Table 7 (page 53) shows a summary table of the means by age group for the A-trait and A-state scores of the 69 club swimmers. It clearly indicates within the data the presence of two homogeneous groups - those swimmers of 15 years and over, and those swimmers of 14 years and under.

Table 6. Three Way Analysis of Variance for A-State Scores for Four Age Groups of Male and Female Swimmers taken at Three Levels of Competition.

Source	Sums of Squares	Degrees of Freedom	Mean Squares	F. Ratio
Age	1197.790	3	399.263	6.259*
Sex	22.347	1	22.347	0.350
Age-Sex	333.433	3	111.144	1.742
S-Within	3891.188	61	63.790	
Level of Competition	3583.273	2	1791.636	106.320*
Age/level of Competition	566.707	6	94.451	5.605*
Sex/level of Competition	3.554	2	1.777	0.105
Age/Sex/level of Competition	103.686	6	17.281	1.025
S-Within	2055.875	122	16.851	

* Significant at 0.05 level.

Table 7. Summary of Means by Age Group of A-Trait and A-State Scores of Male and Female Club Swimmers. The Four Age Groups are Tested Within Each of the Four Types of Trait and State Measures. (With Superscript Notation for Student - Newman - Keuls Multiple Range Test).

Age Group	SCAT	State 1	State 2	State 3
15 years & over	22.00 ^{A}	32.00	41.08 ^{A}	48.80 ^{A}
13-14 years	21.06 ^{AB}	31.75	34.19 ^{B}	39.50 ^{B}
11-12 years	19.73 ^{AB}	30.59	34.05 ^{B}	40.77 ^{B}
10 years & under	18.22 ^{B}	30.17	31.72 ^{B}	38.10 ^{B}
N = 69	20.77	31.01	34.80	41.28

In terms of the level of competition, for State 1 (the training situation) there was no significant difference in anxiety states present among the age groups. However, in the case of State 2 and State 3, the 15 years and over age group were statistically higher in their A-state responses when compared to the rest of the age groups.

The male A-trait and A-state scores for the three levels or states of competition are tabulated in Appendix 3 - Table 10 for the 10 years and under, Table 11 for the 11-12 years age group, Table 12 for the 13-14 years age group and Table 13 for the 15 years and over. Similarly, the female competitive anxiety data is tabulated in Appendix 4 - Tables 14, 15, 16, and 17 illustrating the data for the

recognized age groups.

In order to ascertain whether trait anxiety was correlated to state anxiety in competitively threatening situations a Pearson Product Moment Correlation was performed. However, it was necessary to statistically analyse the trait and state data irrespective of sex and according to the two distinct age subsets outlined above.

Table 8. Summary of Pearson Correlation Coefficients of SCAT and A-State Scores of Male and Female Swimmers of 15 years and over.

N = 13	SCAT	State 1	State 2	State 3
SCAT				
State 1	0.123			
State 2	0.446*	0.188		
State 3	0.544*	-0.127	0.680	

Table 9. Summary of Pearson Correlation Coefficients of SCAT and A-State Scores of Male and Female Swimmers of 14 years and under.

N = 56	SCAT	State 1	State 2	State 3
SCAT				
State 1	0.290*			
State 2	0.248*	0.514*		
State 3	0.210*	0.377	0.748*	

* Significant at 0.05 level.

It is evident from Table 8 (page 54) that the 15 years and over age group for both male and female swimmers have a much better correlation between their A-trait scores and their A-state scores in the case of State 3 or what is judged to be the most significant level of competition. Those swimmers high in A-trait tend to respond with high A-state scores, while those low in A-trait usually respond with low A-state scores in competitively threatening situations. However, there was no significant difference between the SCAT scores and those A-state scores collected immediately prior to the training situation.

A low relationship was found (see Table 9, page 54) between the trait and state scores of the 14 years and under age group even though the number of swimmers was considerably higher (N = 56). The correlation was significant for State 1 and State 2 but not for State 3.

Discussion

In this study it was hypothesized that a significant difference in competitive anxiety would exist between male and female swimmers with the female swimmers tending to score higher than the males and that this difference would be evident across age groups with the trait anxiety scores increasing with age. This hypothesis was supported.

Upon the examination of the A-trait data it was determined that female swimmers scored significantly higher than male swimmers across all age groups. This tends to support the research of Horner

(1974) who reported that females are more anxious than males in achievement situations. Presumably any form of competition provides an achievement setting. For this large initial sample then, females were more prone to high anxiety states in competitive situations than were the males. This sex difference also supports the normative data as provided by Martens (1977).

This study also indicated that there are differences in trait anxiety as a function of age and this is certainly consistent with previous findings within the literature. Spielberger (1973), Hill (1971), Watson (1975), and Martens (1977) all suggest that A-trait is positively related to age. For the females the trend is for the A-trait scores to increase with each successive age group. The exception is with the 15-17 years age group as evidenced in both the male and female data. Of course this may best be attributed to sample effect. On the other hand it might be explained that within the age group competitive structure, the 15-17 years age group are likely to be more conscious of their competitive commitment and so recognize the competitively threatening situation a little more readily. The scores for both sexes drop a little for the 18 years and over category, by which time most swimmers are a little more sophisticated in recognizing both their potential and their aims as far as competitive evaluation is concerned. There are many conjectures why A-trait scores might change with age. Accompanying

increases in age are generally increases in competitive experience and the ability to perceive that certain competitions are much more significant in terms of self evaluation than others. The better a swimmer is as a performer the more exposed he or she will be to the type of evaluative competition where self esteem is of paramount importance. This may lead to natural increases in A-trait over the ages until such time as the swimmer comes to terms with his or her own performance limitations. It is possible for competitive swimmers to become more philosophical about their performance as they grow older and this may be reflected in the slight drop in the A-trait scores once they feel confident that they can produce the desired performance when it really counts.

There are also psycho-social reasons that might account for A-trait differences among males and females and across age groups. Parental pressures may be a serious influence, or a swimmer may be forced to remain in the competitive situation as a means of gaining social recognition. Eventually he or she may become entangled in the demands and expectations of others. At a certain time one age group or sex might be exposed to fiercer competition primarily because of the existing athletic potential in that age group or sex - a situation that could lead to abnormally high A-trait scores for that subset. This may also be reflected in unusually high A-state scores in important competitive situations for those swimmers.

In this study female swimmers demonstrated the highest A-trait scores at the ages of 15 years and above. This may be accounted for both in the fact that women are now competing in a world that is slowly recognizing the role of the female within sport, and at a time when their competitive life span is gradually increasing with the availability of better college programs and financing. Less social and cultural opposition is apparent. Griffin (1971), who used a very general trait measure on female athletes across eight different sports including competitive swimming, found that the highest anxiety scores were evident between the ages of 16-17 years. This study supports that aspect of her findings, but she also discovered the lowest anxiety scores to be present in the 19 years and over category and this conclusion agrees neither with the findings of this study, nor with the norms supplied by Martens (1977). Perhaps the general anxiety measure employed by Griffin contributed to this discrepancy in the results or the expectations for success among female athletes were a lot less then than they are today. As these expectations change, whether they are self imposed or imposed by others, so will A-trait scores fluctuate.

A multiple range test indicated that the 10 years and under female swimmers had significantly lower A-trait scores than the other age groups. This difference might be explained in the fact that competition should be more fun at this stage of development and

consequently have less significance as an evaluative process for the ten years and under. A similar difference was not observed among the male swimmers. However, the trend here may be a particular artifax of the sample studied, and further research may illustrate a more definite competitive A-trait picture.

Even if fluctuations in A-trait scores as a function of age can be conveniently interpreted in psycho-social terms there is no evidence to suggest that participation in competitive swimming tends to make swimmers more or less anxious prone when compared to others as was tentatively suggested by Tattersfield (1972). None-the-less it is an undeniable fact that in any sport some kind of a selective process is in operation at various stages of development.

There was general support for hypothesis #2 and in this research competitive swimmers proved to be no more trait anxious than the norms provided by Martens (1977) with the exception of the female 11-13 years subset. The scores for the 7th-9th grade female swimmers were significantly higher than other athletes within the same grades. Outside of the sample effect this descrepancy might be accounted for in the fact that female competitive swimmers during these years can experience most competition as significant both in terms of evaluation and recognition when compared to most other sports. It is possible for a young female swimmer to establish herself as a world star at this stage of her swimming life. In fact, the South African swimmer Karen Muir is still the youngest world

record holder in any sport today. She broke the 110 yards world record in 1963 at the age of 12 years. This realistic opportunity for world recognition at this age could be very overbearing for female swimmers whether the challenge is self imposed or the result of external pressures and could cause them to compete for the wrong reasons. Then every competition becomes the occasion for extremely high anxiety states. Apart from this difference then, competitive swimmers would appear to be no more or no less anxious in terms of trait anxiety than other sports participants.

If the trait score is important as a guide, it is really the state score taken over a number of competitive situations that is of interest to the coach. In analysing the A-state scores of a smaller sample of club swimmers, no significant difference between male and female responses was detected at three levels of competition. If the predictive value of SCAT is acceptable and research would indicate this (Simon and Martens, 1977) then female swimmers who are higher in A-trait than male swimmer would also be expected to exhibit higher A-states than males in competitively threatening situations. Though the literature tends to support the contention that females are more trait anxious than males there is little evidence in this research to suggest that this difference between male and female swimmers is similarly reflected in the A-state data collected prior to three different levels of competiton. Hypothesis #3 that state

anxiety would increase with an increasing intensity for the different levels of competition was upheld. A significant difference was evident among the A-state scores as a consequence of age. The 15 years and over age group irrespective of sex were statistically different from the remainder of the age groups for State 2 and State 3 but not for State 1 (the training situation). The level of competition significantly interacted with both the age and sex of the competitive swimmers and so influenced their state anxiety responses. The A-state responses of the 15 years and over swimmers were significantly higher for State 2 and higher still for State 3. Maybe their competitive experience of maturity enables them to distinguish between what is more competitively threatening to them and what is not. From a practical point of view this finding suggests to the coach that he or she can be less concerned about the anxiety states of swimmers of 14 years and under, who either because of the lack of experience or on account of their present attitude to competition, are more consistent in their anxiety states when compared to the older and presumably more experienced swimmers. In so far as they can be related, these results tend to support the research of Lampman (1967) who found that anxiety levels increased as the season progressed and the competitions became more significant in terms of the final assessment or more precisely the NCAA swimming championships. Harris (1975) used the STAI instrument to measure the anxiety states

of boys and girls before training and competition. The results of this research tend to contradict her findings in part, where she suggests that boys demonstrate higher A-states before competition than do girls. In this study both males and females exhibit similar increases in anxiety states before different levels of competition. It would appear that females, to employ the same rationale as Harris did in her conclusions, feel the necessity to receive the approval of their peers and to justify their sporting abilities to society as a whole and to perform up to their own expectations or the expectations of significant others. This should leave the females with no more different precompetitive anxiety states than the males. Finally hypothesis #4 which suggests a significant correlation between A-trait and A-state scores exists among competitive swimmers was partially supported. The 15 years and over age group appeared to illustrate higher correlation between A-trait and A-state responses compared to the 14 years and under who were relatively lower. How persistent this age division really is rests in further research. But SCAT would appear to have better predictive value for the 15 years and over than for the 14 years and under.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

In analysing the trait data for male and female competitive swimmers, males and females were found to be significantly different. Female swimmers were significantly higher ($\bar{X}$ = 21.74) in trait anxiety scores compared to the males ($\bar{X}$ = 19.96) and this tendency was consistent across all age groups. This significant difference was also evident as a function of age. However, when this age difference was further analysed using the Student - Newman - Keuls multiple range test no significant difference was perceptible among the five age groups for the male swimmers. The reasons for this apparent contradiction between the one way analysis of variance which indicated a significant age difference and the conclusions of the multiple range test, rests both in the very nature of the multiple range test itself, which tends to be more conservative than the overall one way analysis, and in the fact that perhaps there was too wide a range in the number of male subjects within each of the age categories. At the risk of Type II error it may be better to conclude that there were little A-trait differences evident among the male swimmers' age groups. In the case of the female swimmers, the multiple range test indicated a significant difference between the 10 years and under female swimmers and the remainder of the age groups. The younger female swimmers were

significantly lower in A-trait scores than the older swimmers. For both male and female swimmers the A-trait scores tended to increase across age groups though a slight drop was apparent in the case of those swimmers 18 years and over.

When comparing the SCAT scores of the sample with those of the norms of Martens (1977), which consisted a fairly wide cross section of athletes, no significant differences between the male swimmers and the norms were manifest. Compared to other athletes male swimmers are no more or less anxious prone. In the case of the female swimmers, a significant difference was noted but only for the 7th-9th grades of competitive swimmers, who were found to be statistically higher than their corresponding norm.

In analysing the A-state scores for a much smaller group of club swimmers (N = 69) of mixed ability no significant difference was disclosed between the A-state responses of the male and female competitors. However, a significant difference was evident among the A-state scores as a function of age and irrespective of sex. Swimmers of 15 years and over responded with higher A-states as the competition became more intense, while swimmers of 14 years and under did not. Addressing the hypothesis whether swimmers high in A-trait respond with elevations of A-state in varying competitive situations, while those low in A-trait exhibit low A-states in similar competiton, the analysis of the data demonstrated a better correlation between A-trait and A-state scores for the 15 years and over than for the 14 years

and under.

Conclusions

Hypothesis #1 which contended that a significant difference in competitive trait anxiety exists among swimmers both as a function of sex and age was upheld. Hypothesis #2 stated that no statistical differences existed between the competitive trait anxiety scores of swimmers and those of the norms provided by Martens (1977). This was supported for all age groups and for both sexes with the exception of the female 7th-9th grade swimmers who were found to be statistically higher in A-trait than their corresponding norm. Hypothesis #3 was supported in terms of an increase in state scores occurring as the intensity in the level of competition increased. The level of competition significantly interacted with age but not sex in influencing A-states and a multiple range test indicated the presence of two distinct age groups - those swimmers of 15 years and over, and those swimmers of 14 years and under. Finally, Hypothesis #4 which suggests that those swimmers high in A-trait respond with high A-state in competitively threatening situations while those low in A-trait respond with correspondingly low A-states was upheld for the 15 years and over swimmers but was rejected for the 14 years and under swimmers irrespective of sex.

This preliminary study has attempted to test four simple hypotheses in so far as they specifically relate to competitive

swimmers, and despite the obvious limitations of the study, some interesting practicalities for the coach come to light. The small number of subjects in the second part of the study allow for less conclusive statements but none-the-less there are several avenues for further experiment available.

Recommendations

It is conceivable that SCAT will positively identify for the coach the construct of competitive anxiety as a trait among his or her athletes. Similarly STAI is a proven instrument for measuring anxiety states and has been used to advantage by sports psychologists. Considerable trait and state anxiety data collected on each swimmer over time might reveal an interesting pattern of behavior in differing competitive situations. This information above may assist the coach in coming to terms with his athletes, whether male or female or whatever the age, stroke or event. It may be useful to extend the study to include actual performance. If valid measures of anxiety states can be collected as close to the competition as possible and then related to the performance results, the data may suggest that a swimmer best performs within a certain range of scores. Coupled with overt behavior information the coach may notice in the competitive situation he or she may now be able to help each swimmer prepare for their performance in a much more positive way. Further research is clearly needed here and there may well be a different picture among highly successful age

group swimmers when treated as a group of subjects when compared to the mixed ability sample used in this study.

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APPENDICIES

APPENDIX 1

COMPETITIVE ANXIETY TRAIT SCORES
FOR MALE AGE GROUP AND SENIOR SWIMMERS

AGE GROUP	SCAT SCORES
18 yrs. & over (Senior)	18: 22: 28: 11: 22: 21: 21: 18: 11: 28: 18: 22: 18: 23: 21: 21: 21: 18: 21: 21: 16: 21: 16: 17: 25: 21: 26: 24: 16: 17: 21: 26: 23: 19: 17: 14: 26: 19: 27: 17: 24: 20: 25: 21: 30:
N = 45	MEAN = 20.71 STANDARD DEVIATION = 4.23 VARIANCE = 17.94
15 - 17 years	15: 28: 30: 25: 16: 21: 28: 22: 18: 18: 15: 27: 24: 21: 20: 20: 22: 17: 18: 18: 19: 18: 29: 22: 23:
N = 25	MEAN = 21.36 STANDARD DEVIATION = 4.43 VARIANCE = 19.66
13 - 14 years	11: 20: 16: 20: 19: 24: 25: 12: 19: 19: 14: 20: 16: 21: 22: 21: 19: 17: 23: 11: 27: 11: 17: 16: 26: 18:
N = 26	MEAN = 18.62 STANDARD DEVIATION = 4.51 VARIANCE = 20.33
11 - 12 years	23: 26: 21: 22: 25: 21: 21: 21: 15: 17: 21: 20: 27: 17: 26: 18: 17: 20: 17: 13: 13: 19: 21:
N = 23	MEAN = 20.04 STANDARD DEVIATION = 3.87 VARIANCE = 14.95
10 yrs. & under	25: 11: 14: 17: 13: 21: 13: 26: 14: 20: 20: 19: 19: 21: 20: 18: 16: 17:
N = 18	MEAN = 18.00 STANDARD DEVIATION = 4.07 VARIANCE = 16.59

Male Total N = 137 *Total Mean* = 19.96 *Total SD* = 4.35 *Total Var.* = 18.90

APPENDIX 2

COMPETITIVE ANXIETY TRAIT SCORES
FOR FEMALE AGE GROUP AND SENIOR SWIMMERS

AGE GROUP	SCAT SCORES
18 yrs. & over	24: 28: 14: 19: 20: 16: 19: 25: 29: 29: 24: 21: 17: 28: 24: 28: 19: 27: 24: 22: 24: 27: 24: 19: 24: 19: 18: 23:
N = 28	MEAN = 22.68 STANDARD DEVIATION = 4.18 VARIANCE = 17.49
15 - 17 years	15: 26: 25: 22: 26: 28: 18: 23: 18: 23: 22: 18: 26: 20: 26: 20: 25: 21: 25: 27: 25:
N = 21	MEAN = 22.81 STANDARD DEVIATION = 3.57 VARIANCE = 12.76
13 - 14 years	20: 18: 20: 19: 22: 22: 25: 25: 25: 23: 21: 12: 26: 27: 15: 16: 25: 24: 27: 25: 18: 23: 24: 25: 25: 20: 29: 26: 24: 29: 16: 27: 18: 20: 19: 16: 26: 18: 24: 29: 22: 25: 22:
N = 43	MEAN = 22.37 STANDARD DEVIATION = 4.11 VARIANCE = 16.91
11 - 12 years	22: 26: 24: 27: 18: 12: 20: 22: 22: 21: 21: 23: 20: 16: 27: 21: 20: 22: 17: 25: 14: 15: 22: 24: 23: 20: 20: 25:
N = 28	MEAN = 21.04 STANDARD DEVIATION = 3.76 VARIANCE = 14.11
10 yrs. & under	27: 20: 15: 20: 15: 13: 14: 26: 23: 21: 14: 18: 21: 14: 19: 21: 21: 13:
N = 18	MEAN = 18.61 STANDARD DEVIATION = 4.37 VARIANCE = 19.08

Female Total N = 138 *Total Mean* = 21.74 *Total SD* = 4.18 *Total Var.* = 17.51

APPENDIX 3

TABLE 10

MALE COMPETITIVE ANXIETY DATA

		TRAIT ANXIETY	STATE ANXIETY		
N = 5	AGE GROUP	SCAT SCORE	STAI 1	STAI 2	STAI 3
M. 01	10 yrs. + u	14	23	22	39
M. 02	10 yrs. + u	20	40	43	45
M. 03	10 yrs. + u	19	30	40	54
M. 04	10 yrs. + u	14	28	31	33
M. 05	10 yrs. + u	13	31	32	38

TABLE 11

		TRAIT ANXIETY	STATE ANXIETY		
N = 8	AGE GROUP	SCAT SCORE	STAI 1	STAI 2	STAI 3
M. 06	11 - 12 yrs.	17	30	23	32
M. 07	11 - 12 yrs.	17	20	29	31
M. 08	11 - 12 yrs.	21	36	39	54
M. 09	11 - 12 yrs.	21	33	34	43
M. 10	11 - 12 yrs.	20	30	30	33
M. 11	11 - 12 yrs.	17	31	32	39
M. 12	11 - 12 yrs.	18	33	41	48
M. 13	11 - 12 yrs.	24	32	38	43

APPENDIX 3 (cont'd)

TABLE 12

MALE COMPETITIVE ANXIETY DATA

		TRAIT ANXIETY	STATE ANXIETY		
N = 7	AGE GROUP	SCAT SCORE	STAI 1	STAI 2	STAI 3
M. 14	13 - 14 yrs.	19	29	34	35
M. 15	13 - 14 yrs.	14	27	27	31
M. 16	13 - 14 yrs.	22	30	31	38
M. 17	13 - 14 yrs.	20	30	36	44
M. 18	13 - 14 yrs.	21	27	31	34
M. 19	13 - 14 yrs.	19	28	34	37
M. 20	13 - 14 yrs.	16	30	30	34

TABLE 13

		TRAIT ANXIETY	STATE ANXIETY		
N = 10	AGE GROUP	SCAT SCORE	STAI 1	STAI 2	STAI 3
M. 21	15 yrs. + o	20	28	31	48
M. 22	15 yrs. + o	22	33	39	41
M. 23	15 yrs. + o	24	33	36	52
M. 24	15 yrs. + o	18	31	35	46
M. 25	15 yrs. + o	21	35	38	42
M. 26	15 yrs. + o	28	36	56	59
M. 27	15 yrs. + o	18	31	44	49
M. 28	15 yrs. + o	17	35	35	43
M. 29	15 yrs. + o	21	30	51	58
M. 30	15 yrs. + o	23	36	42	45

APPENDIX 4

TABLE 14

FEMALE COMPETITIVE ANXIETY DATA

		TRAIT ANXIETY	STATE ANXIETY		
N = 13	AGE GROUP	SCAT SCORES	STAI 1	STAI 2	STAI 3
F. 01	10 yrs. + u	15	29	30	41
F. 02	10 yrs. + u	21	26	43	42
F. 03	10 yrs. + u	19	26	30	35
F. 04	10 yrs. + u	26	28	24	31
F. 05	10 yrs. + u	20	38	34	42
F. 06	10 yrs. + u	18	28	30	33
F. 07	10 yrs. + u	23	39	34	42
F. 08	10 yrs. + u	14	21	27	34
F. 09	10 yrs. + u	14	29	30	31
F. 10	10 yrs. + u	21	22	23	25
F. 11	10 yrs. + u	21	36	33	42
F. 12	10 yrs. + u	21	39	33	40
F. 13	10 yrs. + u	15	30	32	38

APPENDIX 4 (cont'd) TABLE 15

FEMALE COMPETITIVE ANXIETY DATA

		TRAIT ANXIETY	STATE ANXIETY		
N = 14	AGE GROUP	SCAT SCORES	STAI 1	STAI 2	STAI 3
F. 14	11 - 12 yrs.	20	28	27	28
F. 15	11 - 12 yrs.	24	37	41	41
F. 16	11 - 12 yrs.	11	31	46	57
F. 17	11 - 12 yrs.	21	33	38	45
F. 18	11 - 12 yrs.	22	30	37	50
F. 19	11 - 12 yrs.	21	34	38	45
F. 20	11 - 12 yrs.	14	32	32	38
F. 21	11 - 12 yrs.	15	30	30	35
F. 22	11 - 12 yrs.	25	26	30	34
F. 23	11 - 12 yrs.	20	27	31	42
F. 24	11 - 12 yrs.	16	30	30	27
F. 25	11 - 12 yrs.	20	28	34	44
F. 26	11 - 12 yrs.	23	29	35	46
F. 27	11 - 12 yrs.	27	33	34	42

APPENDIX 4 (cont'd) TABLE 16

FEMALE COMPETITVE ANXIETY DATA

		TRAIT ANXIETY	STATE ANXIETY		
N = 9	AGE GROUP	SCAT SCORES	STAI 1	STAI 2	STAI 3
F. 28	13 - 14 yrs.	18	36	33	42
F. 29	13 - 14 yrs.	24	34	38	47
F. 30	13 - 14 yrs.	22	29	33	47
F. 31	13 - 14 yrs.	25	36	34	39
F. 32	13 - 14 yrs.	25	31	29	44
F. 33	13 - 14 yrs.	20	44	37	33
F. 34	13 - 14 yrs.	25	28	43	46
F. 35	13 - 14 yrs.	24	37	42	46
F. 36	13 - 14 yrs.	23	32	35	35

TABLE 17

		TRAIT ANXIETY	STATE ANXIETY		
N = 3	AGE GROUP	SCAT SCORES	STAI 1.	STAI 2	STAI 3
F. 37	15 yrs. + o	28	31	42	56
F. 38	15 yrs. + o	25	28	39	46
F. 39	15 yrs. + o	21	29	46	49

APPENDIX 5 SCAT FORM A

NAME _____ CLUB _____

SEX M _____ F _____ AGE _____ DATE _____ GRADE ____

ILLINOIS COMPETITION QUESTIONNAIRE

DIRECTIONS: We want to know how you feel about *competition*. You know what competition is. We all compete. We try to do better than our brother or sister or friend at something. We try to score more points in a game. We try to get the best grade in class or win a prize that we want. We all compete in sports and games. Below are some sentences about how boys and girls feel when they compete in sports and games. Read each statement below and decide if *you* HARDLY-EVER, or SOMETIMES, or OFTEN feel this way, when you compete in sports and games. Mark A if your choice is HARDLY-EVER, mark B if you choose SOMETIMES, and C if you choose OFTEN. There are no right or wrong answers. Do not spend too much time on any one statement. *Remember* choose the word which describes how you usually feel when competing in *sports* and *games*.

A B C 1. Competing against others is socially enjoyable. (A) Hardly-ever (B) Sometimes (C) Often

A B C 2. Before I compete I feel uneasy. (A) Hardly-ever (B) Sometimes (C) Often

A B C 3. Before I compete I worry about not performing well. (A) Hardly-ever (B) Sometimes (C) Often

A B C 4. I am a good sportsman when I compete. (A) Hardly-ever (B) Sometimes (C) Often

A B C 5. When I compete I worry about making mistakes. (A) Hardly-ever (B) Sometimes (C) Often

A B C 6. Before I compete I am calm. (A) Hardly-ever (B) Sometimes (C) Often

A B C 7. Setting a goal is important when competing. (A) Hardly-ever (B) Sometimes (C) Often

A B C 8. Before I compete I get a funny feeling in my stomach. (A) Hardly-ever (B) Sometimes (C) Often

A B C 9. Just before competing I notice my heart beats faster than usual. (A) Hardly-ever (B) Sometimes (C) Often

A B C 10. I like to compete in games that demand considerable physical energy. (A) Hardly-ever (B) Sometimes (C) Often

A B C 11. Before I compete I feel relaxed. (A) Hardly-ever (B) Sometimes (C) Often

A B C 12. Before I compete I am nervous. (A) Hardly-ever (B) Sometimes (C) Often

A B C 13. Team sports are more exciting than individual sports. (A) Hardly-ever (B) Sometimes (C) Often

A B C 14. I get nervous wanting to start the game. (A) Hardly-ever (B) Sometimes (C) Often

A B C 15. Before I compete I usually get up-tight. (A) Hardly-ever (B) Sometimes (C) Often

APPENDIX 6 SCAT FORM C

NAME _____ CLUB _____

SEX M _____ F _____ AGE _____ DATE _____ GRADE ___

ILLINOIS COMPETITION QUESTIONNAIRE

DIRECTIONS: We want to know how you feel about *competition*. You know what competition is. We all compete. We try to do better than our brother or sister or friend at something. We try to score more points in a game. We try to get the best grade in class or win a prize that we want. We all compete in sports and games. Below are some sentences about how boys and girls feel when they compete in sports and games. Read each statement below and decide if *you* HARDLY-EVER, or SOMETIMES, or OFTEN feel this way, when you compete in sports and games. Mark A if your choice is HARDLY-EVER, mark B if you choose SOMETIMES, and C if you choose OFTEN. There are no right or wrong answers. Do not spend too much time on any one statement. *Remember* choose the word which describes how you usually feel when competing in *sports* and *games*.

A B C	1.	Competing against others is fun.	(A) Hardly-ever (B) Sometimes (C) Often
A B C	2.	Before I compete I feel uneasy.	(A) Hardly-ever (B) Sometimes (C) Often
A B C	3.	Before I compete I worry about not performing well.	(A) Hardly-ever (B) Sometimes (C) Often
A B C	4.	I am a good sportsman when I compete.	(A) Hardly-ever (B) Sometimes (C) Often
A B C	5.	When I compete I worry about making mistakes.	(A) Hardly-ever (B) Sometimes (C) Often
A B C	6.	Before I compete I am calm.	(A) Hardly-ever (B) Sometimes (C) Often
A B C	7.	Setting a goal is important when competing.	(A) Hardly-ever (B) Sometimes (C) Often
A B C	8.	Before I compete I get a funny feeling in my stomach.	(A) Hardly-ever (B) Sometimes (C) Often
A B C	9.	Just before competing I notice my heart beats faster than usual.	(A) Hardly-ever (B) Sometimes (C) Often
A B C	10.	I like rough games.	(A) Hardly-ever (B) Sometimes (C) Often
A B C	11.	Before I compete I feel relaxed.	(A) Hardly-ever (B) Sometimes (C) Often
A B C	12.	Before I compete I am nervous.	(A) Hardly-ever (B) Sometimes (C) Often
A B C	13.	Team sports are more exciting than individual sports.	(A) Hardly-ever (B) Sometimes (C) Often
A B C	14.	I get nervous wanting to start the game.	(A) Hardly-ever (B) Sometimes (C) Often
A B C	15.	Before I compete I usually get up-tight.	(A) Hardly-ever (B) Sometimes (C) Often

SELF EVALUATION QUESTIONNAIRE

APPENDIX 7 GRADE _____ STAI FORM X-1

NAME _____ AGE _____ M _____ F _____ DATE _____

CLUB _____ EVENT _____ HEATS _____ FINALS _____

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you *feel* right now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

		NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1.	I feel calm	①	②	③	④
2.	I feel secure	①	②	③	④
3.	I am tense	①	②	③	④
4.	I am regretful	①	②	③	④
5.	I feel at ease	①	②	③	④
6.	I feel upset	①	②	③	④
7.	I am presently worrying over possible misfortunes	①	②	③	④
8.	I feel rested	①	②	③	④
9.	I feel anxious	①	②	③	④
10.	I feel comfortable	①	②	③	④
11.	I feel self-confident	①	②	③	④
12.	I feel nervous	①	②	③	④
13.	I am jittery	①	②	③	④
14.	I feel "high strung"	①	②	③	④
15.	I am relaxed	①	②	③	④
16.	I feel content	①	②	③	④
17.	I am worried	①	②	③	④
18.	I feel over-excited and rattled	①	②	③	④
19.	I feel joyful	①	②	③	④
20.	I feel pleasant	①	②	③	④

APPENDIX 8

SUMMARY OF SCAT TEST STATISTICS OF MALE AND FEMALE COMPETITIVE SWIMMERS GROUPED ACCORDING TO GRADES

Grade	Male SCAT Scores	Female SCAT Scores
College Age Adults	21: 30: 27: 17: 17: 18: 26: 14: 23: 26: 24: 21: 21: 21: 18: 19: 21: 26: 21: 23: 28: 21: 25: 11: 28: 27: 18: 19: 16: 25: 21: 21: 21: 22: 18: 17: 16: 18: 21: 18:	25: 24: 21: 27: 27: 28: 18: 14: 16: 29: 17: 28: 28: 23: 24: 19: 19: 29: 19: 24: 24: 24: 20: 24: 22: 19: 24: 19:
N = 40	$\bar{X}$ = 21.00 SD = 4.10	N = 28 $\bar{X}$ = 22.67 SD = 4.18
10 - 12th Grade	18: 15: 16: 22: 18: 18: 21: 22: 17: 23: 18: 28: 19: 18: 27: 24: 20: 20: 29: 22: 15: 25: 28: 22: 30: 21: 11: 16: 17: 24: 20:	26: 20: 22: 27: 23: 25: 18: 26: 22: 18: 18: 23: 25: 26: 26: 28: 20: 25: 25: 15: 21:
N = 31	$\bar{X}$ = 20.77 SD = 4.57	N = 21 $\bar{X}$ = 22.80 SD = 3.57
7 - 9th Grade	13: 26: 25: 27: 17: 21: 17: 23: 21: 15: 21: 22: 21: 21: 18: 27: 11: 14: 16: 22: 20: 16: 20: 19: 20: 21: 21: 16: 24: 25: 17: 11: 19: 17: 26: 23: 11: 19: 19:	26: 20: 24: 23: 12: 18: 20: 22: 20: 22: 24: 27: 22: 27: 25: 21: 27: 20: 25: 22: 24: 23: 25: 24: 25: 25: 19: 22: 15: 18: 24: 25: 29: 20: 26: 27: 18: 19: 25: 23: 26: 16: 29: 16: 29: 24: 18: 22: 16: 20: 22: 25: 12: 20: 26: 18: 27:
N = 39	$\bar{X}$ = 19.47 SD = 4.13	N = 57 $\bar{X}$ = 22.26 SD = 4.04
4 - 6th Grade	13: 26: 20: 20: 21: 20: 19: 11: 17: 21: 25: 14: 13: 14: 13: 26: 21: 18: 17: 20: 19: 20: 17: 19: 18: 17: 16:	18: 14: 21: 21: 14: 27: 20: 15: 26: 20: 15: 13: 21: 20: 25: 16: 22: 15: 20: 17: 22: 25: 21: 21: 23: 21: 24: 13: 23: 14: 21: 19:
N = 27	$\bar{X}$ = 18.33 SD = 3.86	N = 32 $\bar{X}$ = 19.59 SD = 3.97